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Delayed reconstruction of the superior mesenteric vein with autogenous femoral vein

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A 38-year-old man underwent ligation of the superior mesenteric vein due to traumatic disruption. He developed severe bowel edema with large fluid losses through the open abdominal incision. On postoperative day 9, a superior mesenteric vein bypass was performed with autogenous femoral vein, and this resulted in prompt resolution of the bowel edema and allowed abdominal wound closure. He was able to resume a normal diet and was discharged on postinjury day 39. A magnetic resonance imaging scan performed 1 year later showed a patent graft. (J Vasc Surg 2012;55:1773-4.)

Superior mesenteric vein (SMV) injuries are exceedingly rare.[1-4] The majority of affected patients have associated trauma that takes precedence over the injured SMV. Conventional wisdom, based on retrospective reviews and case reports, suggests that SMV ligation is appropriate when simple venorrhaphy is not possible.[5] Following ligation, most patients will develop some degree of bowel edema due to venous congestion, but nearly all will resolve the edema after several days due to development of abundant collateral flow.[6-8] More than 500 cases of SMV injury have been reported in the literature, but there have only been five reports of initial SMV bypass for acute mesenteric venous obstruction.[3] The remainder underwent ligation or primary repair of the SMV. Intestinal necrosis is a rare complication of SMV injury.[3,9] We report a case of delayed SMV bypass 9 days after ligation of a transected SMV.

CASE REPORT

A 38-year-old male presented to the emergency room after a motor vehicle collision. He was agitated and combative on presentation and required intubation for airway protection in the emergency room. The patient had an initial blood pressure of 80/40 and pulse of 126/minute; a focused assessment of sonography in trauma examination demonstrated hemoperitoneum. He was taken emergently to the operating room for abdominal exploration.

Exploratory laparotomy revealed a transverse colon injury and extensive venous bleeding from SMV transection at the base of the transverse mesocolon. The SMV was ligated for definitive control, as the patient was considered to be too unstable to attempt primary repair. The injured transverse colon was resected and left in discontinuity. Silo closure of the abdomen was performed secondary to a combination of edematous bowel, hemodynamic instability requiring aggressive resuscitation, and worsening coagulopathy. The estimated blood loss was 5 liters. The patient received 10 units of packed red blood cells, 6 units of fresh frozen plasma, 6 platelet packs, and 1 unit of factor VII during the procedure. He was transferred to the intensive care unit for resuscitation and warming.

Over the next several days, the patient was returned to the operating room for repeated explorations, washouts, and transverse colostomy formation. However, extensive bowel edema persisted and prevented abdominal closure (Fig 1). The patient had large ongoing fluid requirements to replace the massive amounts of transudative output (as much as 9 L/day) from the abdominal wound vacuum dressing.

On postinjury day 9, a computed tomography venogram was obtained, which demonstrated a patent splenic and portal vein but no flow in the SMV at the inferior border of the pancreas. Worsening bowel edema and increasing fluid requirements prompted the decision to attempt a delayed SMV bypass. Dense adhesions in the right upper quadrant made dissection and identification of the portal vein hazardous. The ligated SMV was identified in the thickened mesentery approximately 12 cm from the lower border of the pancreas. The vein was opened, and a large organized thrombus was removed intact from the distal SMV (Fig 2). The thrombus was easily extracted by gentle traction; the age of the clot and the increased mesenteric venous pressure made it possible to remove intact. Rapid venous flow followed removal of the thrombus. Balloon catheters were passed into the vein without return of additional clot. The splenic vein was identified along the inferior border of the pancreas, and a femoropopliteal vein conduit was used as a bypass from the SMV to the splenic vein (Fig 3). There was immediate decrease in the bowel edema once the bypass was opened. The bowel edema continued to resolve over several days, and the abdomen was primarily closed on postinjury day 28. The patient was discharged to a rehabilitation facility on postinjury day 39 and was tolerating a regular diet at the time. A magnetic resonance venogram performed 12 months after injury showed a patent SMV bypass.

DISCUSSION

The protected location of the SMV in the deep abdomen and its relative mobility may account in part for the relative rarity of SMV injury. The vast majority of reported cases have been incidental findings in the setting of blunt abdominal trauma. Reported patients have associated abdominal injuries in the following decreasing order: liver, inferior

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Author conflict of interest: none.

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The editors and reviewers of this article have no relevant financial relationships to disclose per the JVS policy that requires reviewers to decline review of any manuscript for which they may have a conflict of interest.

0741-5214/$36.00

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doi:10.1016/j.jvs.2011.12.053

Fig 1. Extensive bowel wall edema led to transudative fluid losses and prevented abdominal wall closure.

Fig 2. On postinjury day 9, a large organized thrombus was removed from the ligated superior mesenteric vein (SMV).

vena cava, kidney, spleen, superior mesenteric artery, stomach, small bowel, colon, duodenum, and pancreas.[3,6] Outcome depends on the degree of associated trauma, not on the SMV injury per se.

SMV ligation is usually well tolerated due to abundant mesenteric venous collaterals.[6-8,10] The decision to repair is usually based on the degree of injury and the condition of the patient.[11] In the present case, damage control laparotomy was necessary due to extensive blood loss and coagulopathy. Ligation was not well tolerated due to thrombosis of the venous collaterals, and the need for revascularization was recognized due to the extensive bowel edema and the associated transudate. We do not know whether simple restoration of the collateral venous circulation with venous thrombectomy would have been adequate. The SMV bypass was performed for intestinal salvage and to reduce bowel edema sufficiently to close the abdomen. Although others have reported success with immediate reconstruction of the SMV,[3,4,9] the present case highlights that it is safe to perform the bypass as a delayed procedure.

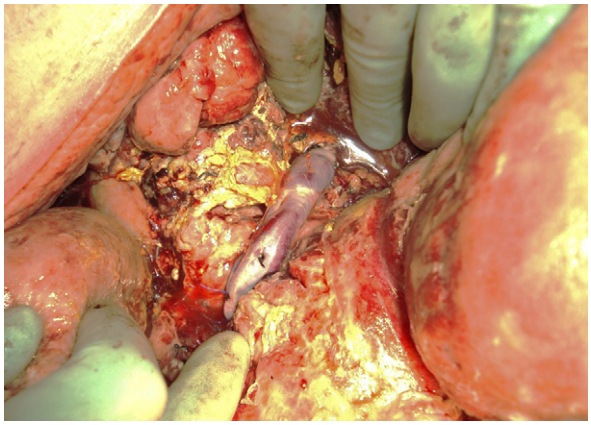

Fig 3. Intraoperative photograph showing the femoral vein graft used to bypass from the superior mesenteric vein (SMV) to the splenic vein.

In the final analysis, the decision to repair or ligate an injured SMV has usually been made at the initial laparotomy. Surgeons have performed immediate SMV bypasses in very rare circumstances, but the decisions have been based on the acute condition of the intestine. The present case shows that ongoing bowel edema may be an indication that the collateral venous circulation is occluded. Delayed venous thrombectomy and SMV bypass are possible and may result in bowel salvage and patient survival.

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Submitted Nov 30, 2011; accepted Dec 20, 2011.